

(A most marked feature after 9h. was the way in which the streamers formed in the north and moved in a procession towards the west.)

9.8.—Lower band entirely gone. Upper band still visible, but faint. Numerous vertically streamers forming and intersecting the horizontal band.

9.16.—Horizontal band had entirely disappeared. Vertical streamers had increased in numbers and intensity. Constant fluctuations in brilliancy until 9.28, when last streamer had disappeared.

Mr. S. L. Elborne, writing from Peterborough, reports that on March 28, about 6 p.m., he saw a magnificent display of parhelia or mock suns, lasting about twenty minutes; on each side of the sun, and at equal distances from it in the same straight line, and parallel with the horizon, appeared a brilliant spot displaying the colours of the spectrum in the centre of each, giving the effect of three suns setting simultaneously; from each arose a luminous band, thus making a splendid arch over the true sun.

THE PUBLIC HEALTH OF THE METROPOLIS.¹

THIS report abounds in information of great interest to all who have at heart the well-being of the metropolis. The first part relates almost exclusively to vital statistics, the second to public health administration, and the third part contains much instructive matter upon school hygiene.

The year 1908 was a very exceptional one for London so far as vital statistics are concerned, for the marriage-rate (15.9), birth-rate (25.2), and death-rate (13.8) were the lowest ever recorded. The death-rate has shown a decline for the past forty years, while in the case of the birth-rate the fall year by year has been slight, but uninterrupted, for some thirty years. What this decline in the death-rate of a population of 4,795,757 persons implies is very forcibly expressed in terms of "life capital." By this expression is implied the years of life saved to the community by a reduction in the death-rate. The number of lives saved at each age period (as calculated by comparing the number of deaths for the year, in each age period, with the mean death-rates for those age periods for ten years, and crediting each life saved with the years representing the expectation of life at that age) represented a saving of 26,205 lives, and a gain to the community of 1,066,770 years of "life capital." The highest corrected death-rates were furnished by the City of London, Finsbury, and Bermondsey, and the lowest by Hampstead and Lewisham.

The infant mortality rate was lower in London for the last decennium than in all save one of the thirteen other large English towns; and London had a lower figure for 1908 than any of those towns. This fact, as Sir Shirley Murphy, the Medical Officer of Health, states, is matter for congratulation, though, as he adds, it needs to be remembered that the infant mortality rate is liable to considerable fluctuation, owing to climatic conditions and varying degrees of prevalence of epidemic maladies. There are notable differences in the rates of infant mortality in districts well and badly circumstanced socially, a fact which sufficiently indicates the results which might be obtained if the infants of the less favoured districts had extended to them the same care as that bestowed upon infants of the better favoured districts. Among metropolitan boroughs the loss of infant life has for several years been greatest in Shoreditch and Bermondsey, and least in Hampstead.

The infant mortality rate is, of course, affected by the administrative efforts made to reduce it, but the rate is so extremely sensitive to other influences, which vary from year to year, that the value of this work cannot be judged by the mortality of the moment. Among systematic efforts now being made in the metropolis for the preservation of infant life, Sir Shirley Murphy commends the system of visitation by health visitors, and he points out that the Notification of Births Act, 1907, which is such a valuable measure for enabling this work to be undertaken most

advantageously, had in 1908 been adopted in all but eight boroughs. In some districts official workers were supplemented by a staff of voluntary workers supplied by local health societies.

During the year 1908 the lowest death-rate from the epidemic diseases was recorded. No death occurred from small-pox, and the deaths from measles, whooping-cough, diphtheria, enteric fever, diarrhoea, and phthisis were below the averages of the last ten years, but those from influenza and scarlet fever were above the averages.

The London vaccination returns give food for thought and apprehension. As legislation has made it more and more easy to obtain exemption from vaccination, the unvaccinated children would be expected to increase. The latest returns recorded are those for the year 1906, when the percentage of unvaccinated children was 21.2, as against 26.4 in 1896, 7.8 in 1886, and 6.5 in 1876. There can be little doubt that the percentage of exemptions for the past three years will, when these are available, demonstrate a considerable increase. A notable feature in the behaviour of enteric fever in London in recent years has been the manifestation of localised prevalence occurring in poor populations and lasting often for a considerable number of weeks. There were two such prevalences in 1908, one in Bethnal Green and the other in Shoreditch, and Dr. Hamer furnishes, in an appendix, a full report on these two outbreaks.

Special reference is made to results obtained by Dr. Sidney Davies from the voluntary notification of zymotic diarrhoea among infants in Woolwich in the months of July, August, and September. Dr. Davies is of opinion that the infection spreads from person to person, and he thinks the distribution of the cases is consistent with the hypothesis that the disease is conveyed by flies. An examination of the statistics contained in his inquiry shows that while infants who are breast-fed suffered much less than those artificially fed, there is not much difference between the incidence of attack on children fed on cow's milk and those fed on condensed milk—except among the children fed on cow's milk at the Infants' Milk Depot, who suffered much less than other infants artificially fed.

The phthisis death-rate for 1908 was the lowest ever recorded. It amounted to 1.32 deaths to every 1000 persons living during the year. In dealing with phthisis the Medical Officer comments upon the work done in connection with the voluntary notification system in operation in twenty-one London boroughs in 1908, and he refers to the Order of the Local Government Board requiring notification of cases of phthisis in London which occur in Poor Law practice. London is, however, as the medical officer points out, but very imperfectly provided with the opportunities which are needed for utilising the knowledge thus gained. Phthisis mortality occurs especially among the poor, and measures for its reduction must not only include sanatoria and hospitals, but also those which afford assistance not only to the sufferer, but often to the families which are dependent upon him. It is here that the extension of philanthropic effort is greatly needed.

For the purpose of enabling the incidence of cancer on the several populations of the London sanitary areas to be more precisely stated, factors have been calculated for correcting the death-rates, so far as possible, for the differences in the age and sex constitution of the several populations compared. When these allowances are made it is found that in the year 1908 St. Pancras (1.17) had the highest rate, and that the lowest obtained in Fulham (0.79).

The question of nuisance from flies in connection with deposits of house refuse and stable manure has again been dealt with on lines similar to those followed in 1907, and the observations form the subject of another appendix to the report. In 1907, as in 1908, the large part played by collections of horse manure in determining fly prevalence was abundantly apparent, and the need for regulating the sanitary condition of stables was thus again emphasised.

On July 1, 1908, the administration of the General Powers Act, 1907, part iv., was brought into operation, and from that time until the end of the year 620 samples of milk were taken, principally from churns at the large railway stations. Of the samples in which it was found practicable to make a complete examination, 11.6 per cent. were found to be tuberculous. The farms supplying the

¹ Report of the Public Health Committee of the London County Council, submitting the Report of the Medical Officer of Health of the County for the Year 1908. (London: P. S. King and Son.) Price 3s. 6d.

samples giving positive results were inspected by the council's veterinary inspector; 4997 cows in all were examined, and of these 147 were found to present tuberculous udders. Provincial local authorities have shown willingness to cooperate with the council in preventing the sale of milk from cows which the council's veterinary inspector has certified to be suffering from tubercular disease of the udder, and in a few instances veterinary inspectors have been appointed by the local authorities to deal with this danger.

The report by Dr. Kerr upon the medical work of the council, as the education authority, deals with a period for the twenty-one months ending December 31, 1908. This period has been marked by great activity in all matters concerning school hygiene and the physical care of children. There are, in the opinion of the medical officer, further and wide-reaching changes in prospect. He states:—"Any public provision for protecting and aiding growth and development of children during the years of school life—three to sixteen years of age—should be entirely committed to the Education Authority. This would allow such matters as feeding, teaching, cleansing, medical treatment, or social protection of school children, when these duties become a public care, to be administered by the one authority, and by bringing all the various problems into a correct relation and perspective would also effect considerable financial economy. On the other hand, transient conditions in which the child bears the same social relations as any other individual, as for instance when affected with typhoid or scarlet fever, or when guilty of a crime, would still come under the same provision by the Sanitary Authority or Police respectively as at present. Fortunately this is the line taken by all the recent legislation in matters concerning children."

The educational work of the county council which falls under the direction of a medical officer is very extensive, embracing the examination of candidates for employment and scholarships; medical inspection of school children, including the inspection and the hygienic condition of school premises, &c.; a large amount of work to promote cleanliness and to prevent communicable disease; and prescribing the special school work amongst the scholars in schools for the mental or physically defective, the blind or deaf, &c. The medical staff at the end of 1908 numbered fifty-two, and it has been decided to increase the staff by the addition of sixteen school doctors in the summer. The school nursing staff consists of a superintendent, two assistants, and fifty-one school nurses; these undertake the oversight of personal hygiene in both elementary and secondary schools. Upon the subject of underfed school children, the medical officer directs attention to the fact that there is no certain criterion of this condition, and it seems often quite impossible to distinguish between bad feeding, improper feeding, and bad home conditions. The treatment of those children in whom medical inspection discovers defects has received a great deal of consideration at the hand of the county council. A solution has not yet been arrived at, but it is certain that visual troubles, discharging ears, ringworm, and conservative dentistry are matters on which neither the private practitioner nor the hospitals can give sufficient or satisfactory relief, and the establishment in London of school clinics to deal with these conditions amongst school children will probably be the eventual solution. The work of the school nurses was almost entirely directed to effecting the cleansing of scholars' heads, bodies, and clothing. Nearly twenty thousand children are known to the nurses as uncleanly in these respects. That such conditions are tolerated gives an idea of the conditions of the homes, which are often so dirty and dark, and wanting in the means of cleansing, that it would be an injustice to exclude such children and prosecute the parents. It appears that the municipal cleansing stations provided for cleansing verminous persons are inadequate to deal with all these cases. The Children's Act, 1908, gives power to the education authority to examine and cleanse these children in default of the parents, and it looks as if that authority will have to make some provision for dealing with these cases, at least in some parts of the metropolis.

The open-air schools provided by the council (four in number) are doubtless doing a great service, physically and

educationally, to children with ailments which unfit them to take their place in the school class-room with the ordinary scholars. Children with scrofulous and tuberculous conditions, anæmia, adenoids and enlarged tonsils, heart disease, and certain bone, nervous, and eye diseases, profit considerably by a few months in these open-air schools.

PROBLEMS OF THE SOUTH-WESTERN HIGHLANDS.¹

THE southern Highlands of Scotland consist of a complex series of gneisses, schists, crystalline limestones, and quartzites, trending across Scotland approximately from south-west to north-east. These metamorphic rocks are bounded abruptly to the south by the Highland boundary fault, which brings them against Upper Palæozoic rocks. Their northern boundary is less regular, and is generally the junction with the Moine gneiss, the rock which occupies so much of the Northern and Central Highlands. The schists and the associated rocks between the Moine gneiss and the boundary fault may be conveniently grouped together, under the name proposed by Sir Archibald Geikie, as the Dalradian system.

The most important difficulty in the interpretation of these rocks is the uncertainty as to which is the upper and which the lower end of the succession. According to Nicol, the southern members are the youngest, and there is a descending series to the north. This view is contradicted by many obvious facts in the field geology, and the view is therefore widely held that Nicol's order must be reversed, and that the beds of the southern margin are the oldest. One serious difficulty in the second view is that the southern rocks are much less altered than the northern, and this theory therefore involves some measure of selective metamorphism. Several ingenious interpretations have been advanced to overcome this difficulty. The author of the address, however, held that both views as to the order of succession are correct in parts. For convenience of reference, the Dalradian system may be divided into five series, which, with their relations to the other pre-Cambrian rocks, are shown in descending order, as follows:—

Algonkian	Torridon Sandstone		
Dalradian	Main sequence		On Southern Margin
	(5) Schichallion Quartzite	(4) { Blair Atholl Limestones and Black Schists and inter- bedded Quartzites	Age ? Upper Dalradian or later
	(3) Ben Lawers series		Aberfoil Slates and Grits
Caledonian	(2) { Loch Tay Limestones and associated garnetiferous mica schists	(1) Loch Lomond Gneiss	Ben Ledi Schistose Grits
	Moine Gneiss and associated schists		
	Lewisian	Lewisian Gneiss	

This classification adopts Nicol's succession in part, as it accepts the Aberfoil and Ben Ledi series as younger than the Loch Lomond gneiss, against which they rest, and it is consistent with the less altered condition of the southern rocks and the steady diminution in the metamorphism of the rest of the rocks going northward, as, for example, from the Loch Lomond Gneiss to the Loch Awe Grits, and from the garnetiferous mica schists of the Loch Tay series to the black schists and unfoliated quartzites near Blair Atholl.

The evidence in some points of this succession is still incomplete, especially as regards some of the rocks within easy access of Glasgow. The special points on which

¹ Abstract of the Presidential Address delivered to the Glasgow Geological Society, by Prof. J. W. Gregory, F.R.S.